

DRAGON



USER

The independent Dragon magazine

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March 1986

Exploring Dragon machine code

The Logical Dragon

Flee! — Arcade Action

Communication

6809 Express
coming your way

DRAGON USER



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01-837 4343

Editor
JOHN COOK

Production Editor
SARAH-JANE HALEY

Software Editor
GRAHAM TAYLOR

Editorial Secretary
JUCINDA LEE

Advertisement Manager
SHONN LANGSTON

Administration
DAVIDSON SMITH

Managing Editor
PETER MORLOCK

Publishing Director
JENNY IRLAND

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How to submit articles

The quality of the material we can publish in Dragon User each month will, to a very great extent depend on the quality of the submissions that you can make with your Dragon. The Dragon computer has launched us to the market with a powerful version of BASIC, but with very basic documentation.

Articles, which are submitted to Dragon User for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on paper which is clean and be accompanied by a tape of the program.

For colour graphics to return, every submitted article or program, or please keep it copy. If you wish to have your program returned you must include a stamped, addressed envelope.

Contents

Letters

Melbourne House Book awards — Free bulletin board — Pope Gregory XIII shock horror — More Poems for your favourite Dragon games — National Dragon Users Group ... bug of the Year?

News

1985 gets off to a slow start — Inexplicable announces new release and changes the trilogy — Dates for Wintersoft's Jack-in-the-Box — Inside for details — Dispatch delay at Eclipse Perman...

Top Ten Chart

You ... a chart for Dragon software, compiled by you, the user. Votes have started flooding in — this is your chance to vote in People's Chart Two.

Communication

Problems, problems ... we want to hear about it! Send all your Dragon related queries to this column and get results fast. Or maybe this is your chance to help out a fellow Dragon owner?

Fleef

The ultimate maze game for your Dragon — this one is hot! Brought to your computer by the programming team of Colin Hogg and Diane Rogers.

Machine Code Tutor

So here's not just a pretty face ... Jason Orbsen et al. start a series on machine code for humans! Don't miss it.

Logical Dragon

Peter Witaker shows you how to make your Dragon learn with this expert systems program.

Editorial

UNQUOTEABLY, one of the major personal achievements of the last 11 months was the Star Aid/Life Aid appeal, started by an individual as unlikely as pop-star Bob Geldof. Blasted by scores of news stations in drought stricken East Africa, his idea of "getting people off their backsides" (astonishingly passed over in the New Year's Honours List) swept the country and culminated in the global event known as Life Aid, last summer. And there were plenty of spin-offs too: Fashion-Aid, Opera-Aid, Camera-Aid ... and more relevant to the home computer industry, Soft-Aid.

Masterminded by ex-Quickdrive supremo (now Electric Dreams MD) Rod Crossman, this compilation tape raised over £500,000 for the Ethiopian appeal — a fine effort by everyone concerned. There was just one problem for Dragon owners however — the tape was only for Spectrum and Commodore machines — which left just a little bit out in the cold.

Following the success of Soft Aid, another charity tape is being prepared as I write. Entitled "Off the Backs", the proceeds from its sale will go to the Princes Trust for Drag Aids Rehabilitation — an organisation concerned with helping drag addicts beat their addictions. A worthy cause indeed. And the good news for the computing community is that even more people can join in the effort, as Amstrad and BBC have been added to the list of machines catered for. But ... silences Dragon.

OK, so maybe we understand the commercial reasons for not including us, but that still leaves a minimum of 50,000 odd active Dragon owners all dressed up with nowhere to go.

Of course, someone could always "get off their backsides," but that only happens in fairy stories — doesn't it?

Reviews

Some old, some new, some borrowed ... Jason Orbsen dips his hand in the goodness bag and passes judgement on what comes out.

Mixing it

Pam d'Arby time again. This month a detailed look at passing values from BASIC to machine code. Check it out.

Firmware

Brian Dodge continues his stroll around the Dragon Room, this month dealing with Assembled Vectors. Just what the doctor ordered.

Cupid

Ah ... it's springtime and romance is in the air. Steve Gathercole rises to the occasion in the shape of this amiable gem — in 150% code.

Dragon Answers

Brian Dodge consults the oracle of Delphi and comes back with some useful answers to a whole bunch of reader enquiries.

Adventure Trail

Mike Gerrard is in a particularly helpful mood this month. Page 29 for details.

Puzzgrid

Construct your own wordsearch puzzles using this program sent in to us by C.L. Mayler.

Competition

Conan Lee sets out to barmy and bumble us again, but for the win, a copy of Quickbeam's 6809 Express could be waiting.



Letters

Good Showing

RE THE November 1989 Show, I felt that the show this time was not quite as good as previous ones, but it is needed to keep the Dragon alive. I always enjoy looking for special offers and the chance to look at and try the new hardware.

Having started with the Dragon as a games-machine, I am now looking for much more useful/educational software for my 11-year-old daughter, and am using the machine with Disc Drive and using Word Processor packages and program writing aids.

Has anyone Dragon User. We need a 1989 show. We definitely need all new information and advertisements.

Bryan Smith

Book Errata

THANK YOU for arranging the special offers with the Macmillan House. I have studied the book Dragon Assembly Language for the Absolute Beginner for several weeks. It is most interesting and can be recommended to persons like myself who are beginners.

There are, however, a number of errors which are most confusing. They are:

1. There are 20 sample specimen programmes in Chapter 14. None will work because of an elementary error in the leading programme page 128. To rectify, one must move the contents of "line 00" to a new line position, eg as "line 25".

2. There is a major leading programme on page 125. It has an error in the subroutine which begins with line 400. The subroutine is intended for reads of machine code segments, but it does not have an "exit", or a "use" statement. The program may have another entry in the subroutine starting with line 400. I could not make it work, but this may have been because I did not know what it was supposed to do. Finally, I do not understand the purpose

This is the chance to air your views — send your tips, comments and complaints to Letters Page, Dragon User, 12-13 Little Newport Street, London WC2E 7EP.

of "line 8" of this program.

3. There is a big mistake in the specimen program "MUSICA". On page 197, starting at address &H4000, the hexadecimal entries should be 8E, 2B, 87, 2B, D3, 2B, 3F, 2D, D0, 30, 68, 00, 8E, 36, 70, 39, 8A, 30, and 0B.

In spite of the above defects, it is a most interesting book.

J. D. Stinger
Tykes Grove
High Wycombe
Bucks

Bulletin News

HANWELL recently started running a small bulletin board on the Dragon 32. I was wondering if you would be so kind as to inform other Dragon users about the service, through the pages of Dragon User. The details are as follows:

The board runs at 300 baud baud, 7 character parity, 1 start bit, 1 stop bit, and is on line 6 nights per week (Sunday to Thursday) 9.00 pm until 7.00 am, on line 8000 user number. The board uses amplex and 20 minutes per call is allowed. Although running on a Dragon 32 there are users of other machines who use the system, ie. Apollo, BBC, Amstrad, etc. The board is called "valley" and was written with the intention of introducing some humour to the BBS area.

M. B. Armitage
107 South Terrace
Moles Bar
Sheffield S11 0QZ
Tel: 0114 773584

Pokes

NOTICING that the only info for the games for ages was the one for Joe Bell (myself), I decided to send in some Pokes I've found myself. Most of the games are getting on a bit, but hopefully that means most people will have them! Here they are:

THE BELLS (Keyboard version only) — Poke 103290-103295 (hex)
OUTHERST IN SPACIE —
Poke 17172, 0-254 (hex)
ROCKHEAD — Poke 103040, 0-254 (hex)
TREATME — Poke 106023, 0hex

MONSTER — Poke 23628, 0-254 (hex)

CURSEY MURKET — Poke 15161, 1-127 (hex)
CHOPPER STRIKE — Poke 13108, 0-255 (hex)
POGO-JO — Press zero for 1000 level — your points, which usually go up in 10's, will go up in 1000's!

SCORCH STRIKE — type "FIREBRE" when the game starts (after pressing the up cursor key). Now using the left and right cursor keys, you can go forward and backward through the screens.
I hope these Pokes are of use!

Robert Gossling
87 Tolerton Drive
Ayrshire

Power Pack

AS SOMEBODY occasionally asked to repair Dragon 32 computer fails and pieces, I have noticed two or three items in your mag about the mains transformer burning out.

I have now had three burnt-out transformers sent in for repair in the last two months. They are irreparable, of course, but the cause of the problems in every case is that the input plug to the rear of the Computer has had a loose cable grip松開. The wires inside have twisted around each other and short circuited, burning out the power transformer secondary.

I would advise every Dragon owner to immediately check that the cord grip screws in the grey covered power plug from the transformer to the Dragon is securely tightened. Even better, open up the plug and check all the soldered connections are OK with no exposed wires ends.

An even better solution would be to break the transformer to computer lead and insert fuses and fusible links in the line, thus protecting the transformer.

Finally, this transformer would be better out of its box and fitted in a larger, ventilated box along with new fused protection — if you are technically minded.

I am still seeking on a suitable replacement transformer for the Dragon, but I would advise people whose transformer has burnt-out to check their machine as sometimes a transformer's internal damage could have been done to their Dragon, as well as the transformer!

N. Bealeby
518 Material College
Marsden
Huddersfield

Leap Year

I HAD always understood it to be common knowledge that Roger Gregory 201 anticipated the leap year rule in 1982 and not, as written on Page 42 of the January 1989 edition of Dragon User, 1977.

This would be of little concern to me were it not for the fact that it caused me to lose a bet with my Father!

Peter Castwell
22 Squashley Lane
Orrell
L67 7LP

Any other hints for the exact date of this momentous event? Meanwhile, Peter, may this exercise be a lesson to you on the perils of gambling. In gambling, (remember S&E for definitive list of those less damaging on your pocket).

Value

PATRICK O'NEIL is so right about the National Dragon Users Group. The newsletter, "Dragon Update", is filled with useful information. Correspondence with several Groups here gives me the information necessary to get my C64 up-and-running operational (not thanks to the internet) as well as introducing me to other Dragon users in Israel. They are the Dragon "Buy of the Year".

Harry C. Taylor II
Editor

Thanks for these tips . . . we would emphasize that you should only attempt any repairs or modifications to your transformer if you have the necessary technical competence or you could be setting yourself up for a whole bigger bunch of trouble.

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News desk

Incentive — new release

INCENTIVE seem to stop the spread of any scouring rumours (passed heaven knows where!) that they are halting development of new Dragon games. By announcing the development of their next game, Time Lord, for the Dragon 30.

Described by Incentive's Ian Andrews as, "a multi-screened 3-D arcade adventure," the plot involves destroying the evil arch villain Haco. During the game, you must explore Haco's castle, seeking out and battling with various guards, to locate parts of a magic talisman which will gain your access to the Inner Temple where Haco lies sleeping... and then on to the final confrontation.

This is the first Dragon game written by the long-time Incentive stalwarts Peter James and Roger Thack, but with the promise of "Marty Madness

type 3-D." The owners look good. Time Lord should be available around mid-May from Incentive, priced at £7.99. Contact them on 0734 571578.



Re Dragon User News Desk last month, the Incentive/Moon Cresta competition to win an original Moon Cresta arcade machine will close at the end of 1988 — so don't say that you've not got time to practice.

Juxtaposition delay

THOSE adventurers waiting for *Juxtaposition Part Two* (Developer of Runes) are going to have to wait that little bit longer than expected — as developer and having trouble fitting it all in memory.

"The game is going to be released later than anticipated," said Birmingham's John Humphries, best-known for an Easter launch. "It all goes well." This compares to the original launch date of mid-February.

The actual game design has been extended to produce a bigger game — possibly in two

parts. The first part concerns the task of gathering together a band of companions to face the might of Glaceman Black. The second part is continuation of strategy and combat-based adventuring steeped with the confrontation itself, as you battle it out with the Evil Horde. This programme will feature some 3D-style graphics, as well as the "Panoramic Displays" that were such a hallmark of the original.

For further details, contact Juxtaposition, 30 Uganda Park Place, Erdington, Birmingham, EN3 2PT. 01-887 5780.

Total Eclipse — the public wait

BIRMINGHAM based Software House Farnell Ltd have recently been the subject of investigation by West Midlands Consumer Services, following complaints from dissatisfied customers passed on to them by Dragon User. Company spokesman David Bentall names faulty tape du-

alation and other technical problems on the delay in dispatch of their first release *Total Eclipse*, but is confident that orders will be fulfilled by the end of January. He added, "If anyone requires a refund rather than waiting for the game, we can send a cheque within 48 hours."

West Midlands Consumer Services can be contacted on 021-784 2526 — contact Mrs S. Lewis.

Dragon User People's Chart

Power to the People! In our most-recent Dragon User — so this month (and every month!) we are now going to offer you the chance to air your personal preferences to the software providers, by voting in the Dragon User People's Chart!

Ever since the majority of retail outlets started stocking Dragon programs (as they seem to have even more difficult to assess), the Dragon scene has lacked that one thing many self-respecting media need here — a chart. Love it or hate it, it's actually a useful thing, if only to check to see if everyone else shares your good taste.

So, even with the reader in mind, we are nice initiating a People's Chart — for you to vote for your top five Dragon programs (games, utilities or applications) each month.

And just to make it that little bit more interesting, this month Microdeal are offering £25 worth of software (of your own choice) to the winner of our associated dragon competition. Who said anything about a competition?

Well, to make things even more interesting than that, we're asking you to construct an anagram from just too three — the cleverest winning the goodies. Give it a try ... you know it makes sense!

This is what you do

Each month, Dragon User will be compiling its own special Dragon software 'Top Ten' chart — compiled by you! And each month we will be sending £25-worth of Microdeal software to the person who sends us, with their personal top ten, the most original phrase or sentence made up from the letters you don't have to use them all in the titles of their top three programs.

You can still vote in the chart without making up an anagram — but you won't be in with a chance of winning the prize. All you have to do is fill in the form below (or copy it out if you don't want to damage your Dragon User) and send it off to: People's Chart No. 1, Dragon User, 10-13 Little Newport St, London WC2H 7TP.

Chart Two

Voting for Chart No. 1 closes at 1pm on Friday 10th March 1989. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5, Voting Month 1:

1.
2.
3.
4.
5.

Name

Address

My phrase is:

Communication

Problem: I'm new! Has anyone out there got a copy of Dragon Fury by Casic Software? Any price paid, but must have instructions. Must be in fairly good condition.

Enquirer: Steven Paine, 34 Newnham Road, Thornton Heath, Surrey CR4 8NA.

Problem: Need info or append routine for basic and/or machine code.

Enquirer: David Pipe, 44 High Avenue, Shirehead, Essex CM15 8HJ.

Problem: I am at present working on my O' level computer project which is a cassette tape to make a Dragon plus tape and, if any finding difficulties when it comes to file handling (ie., record searching and file extension). Can anyone recommend a good book?

Enquirer: Michael Walker, 17 Linton Avenue, Collier Row, Romford, Essex RM7 8NH.

Problem: I have a Dragon 32 with Dragonboard disk system. Recently I was using a graphic program, when the disk started to crash. Afterwards, I listed the directory and found that although it was showing the correct amount of free space, it

did not list the last few programs. Is there any way of recovering these lost programs?

Enquirer: P. J. Wiles, 41 Queen's Avenue, Bexleyheath DA6 1PS.

Problem: Could anyone explain how to determine the addresses for OS486, OS600 and CLEAR? Also the same for assembler programs (ORG & PLT) without Address.

What do I have to do with PRT and END and labels like ROUTINE, and how to CS486N from Address? I am a complete beginner in machine code.

Send in your questions, requests, and pleas to Communication, Dragon User, 12-13 Little Newport Street, London WC2E.

Enquirer: Luc Driessens, Wilhelminaweg 57, 2045 Heverlee, Belgium.

Problem: I am hoping to use my computer to control my very complex model railway. The only problem being is I wish to use infrared remote control, where the computer produces the frequencies and the necessary data for the decoder.

I do not know much about the output from my Dragon or which is the best port to use.

I have to use machine code but I do not know how to address the necessary parts of memory for controlling the output ports. I would be very

grateful if anyone could help me.

Enquirer: G. J. Taylor, Ramsey Lane, Barnetts, South Hartmoor EN3 8RN.

Problem: I am now using a Comstar DOS with my Dragon 64 and emulators to convert a number of my programs to Disc Operation. Unfortunately the Comstar manual, and Comstar themselves, are not too helpful.

Can anyone please give me some assistance?

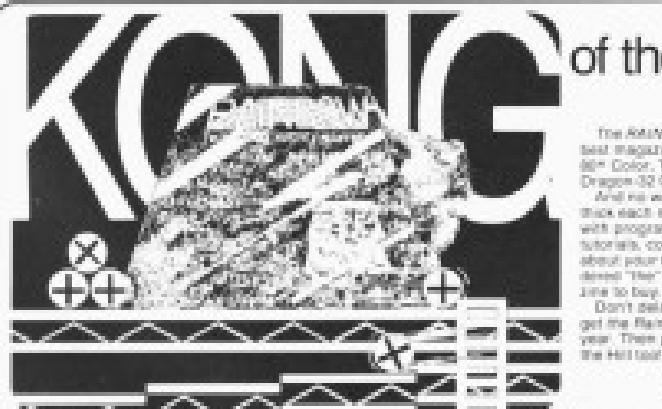
Enquirer: Peter Sargeas, Byways, Oak Lane, Broadbridge Heath, Horsham, Sussex RH12 3LX.

Communication

Stuck for a routine? Need some obscure equipment? Feeling cut off? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (make it as brief and logical as possible) together with your name and address and send it to Communication, Dragon User, 12-13 Little Newport Street, London WC2E 7PP. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

Problem:

Name: _____
Address: _____



of the hill!

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Flee! Flea!

A superlative maze game by the team of Dave Rogers and Colin Hagg

THIS, this is a maze-chase Pacman-type game, but we have given it its own definite style and flavour, from the unique use of the Dragon's resolution modes (including Previous Dragon blindness) to the distinctive and cleverly designed mazes. To play, it is fast, challenging, and we believe as good as (or better than) any game of this genre available for the Dragon.

All the features expected of a good maze-chase are included: multiple tunnels, power rings, health-ups in four directions, bonus items, a highly intelligent player-seeking algorithm, up to six "Progressively Aggressive" opponents (and bonuses for catching them), six different screens and colours, extra lives for clearing them, and so on... yet the program is relatively short. Other neat features include a control key response (related to colour anticipation) when turning, constant jumping, much smoother play, 12 different sound effects/tunes, and a fully functional demonstration mode, which also cycles through the six screens. So even if you can't clear them all yourself at least you can sit back and see what you're missing!

The only compromise we have made is the program is a slight delay between certain screens (15 seconds while video modes are altered, etc) so to do this my taster would have required considerably more code.

Overall approach

We use a "reduced screen" system, and this is well worth describing because the cost could easily apply to almost anyone. The game is actually played on the Dragon's full-resolution (640x200) screen, where each character mapped and located in a simple, straight-forward way, starting at address 1624. Only those parts that change on these reference screens are translated, by means of a machine-code-table, onto a choice "play screen", this latter being the only screen actually seen by the player.

By using this method, all of the game logic can be programmed using normal character codes and packed on to a single screen, which can also be easily packed-in to perform collision checks, route-seeking, tunnels, tunnel moves, etc.

Meantime, the visual screen can be made as detailed as you like and its characters and colours can be scattered around without affecting the actual operation of the game in the slightest! Since the indexed screen is never directly seen (unless you press Break!) it doesn't matter what it looks like, so you also gain the freedom to choose characters with codes that make the programming easier. For example, we arranged all the characters

that are valid or invalid (for the player or for the "Fees" to move on to) into completely-different numerical groups.

To update the three screens we use three different machine-code subroutines. While we are discussing these the main machine code functions will also be covered:

(1) **Basic Image** (Ripup = 31851). This updates the main screen, but is too slow to be used all the time because it has to scan the 32 x 16 characters on the indexed screen. Then refer to **bit-pattern-tables** to find the corresponding 8x8 characters and encode a total of 32 x 16 bytes of these onto the 16x20 screen (you can see the speed of this scan when it does a colour change "wipe-down" between screens here and there).

(2) **Basic 121686**. Updates the score display (say, step 10). Used for example when bonus is being counted up.

(3) **WSR100 (address = 31852)**. This calls the main machine code routine that takes care of ALL the movements. It moves the Fees about the indexed screen as dictated by the player-seeking-algorithm, etc. (the player's position being passed via \$16 Line 60) but then it also updates specific areas of the 16x20 screen, these being: Bushes (where the fees' positions reach their previous position); replacement characters; the player's position; below, left and right of the player (so, whatever way he was moving the update will not off his previous position); and finally, the score-display. This main routine also does the following: scans the screen for dots to see when it has been cleared; detects when the player has been caught by a Fee if a power ring has been eaten then it starts to decrement the value in the power ring counter (addresses 2180/7) and detects when this reaches zero. It accordingly returns to Basic with a number between one and four, which is then used by the On-Goto in Line 60 to reach the appropriate basic routine ("1" for screen cleared, "2" for power ring expired, "3" for normal, "4" for player hit).

Poke Here FF23 Video colour control.

Basic 31042 Increases "Fee" stories with start positions, etc.

Poke Here FF3/FFC8/FFC7 Selects video mode used.

Typing-in Use

The machine code data-tables and the strings holding the compressed maze data are all checksummed, so yes, first few runs will almost certainly result in error messages directing you to look at certain lines and correct typos mistakes. Unless someone reaches the Dragon checks lines in Run time, not when emulated, so you should select Demo mode and leave it to repeat through all six mazes and bonus, so as to

give the program the opportunity to spot any mistakes. Having corrected all errors don't forget to re-tape a few copies!

MD: Line 800: All inverse characters: A, A, a, I, I, A, D, A, I, Invert A's

Line 810: "Press P to play, D for Demo". The well-known "speed-up" Poke at Line 200 (network on most Dragons but not all if it doesn't), then just erase the line and since we used it only to accelerate maze decoding, the main game will still run at the same speed.

Don't save the game in Fast Mode, it won't load back¹ if in colour/poke HEDX FF06,0 to return to Demo Mode.

Playing

At any time during active demo mode or at the end of a game you can press F7 to play and during play you can pause by pressing Shift+C. Screen one is particularly easy while screens four (Bandy Castle) and five (Face the Face) are particularly difficult but not impossible! In fact there are quite easy ways to clear all the screens, we have both done it, but unlike inferior Pacman type games, it needs practice and the formulation of definite strategies!

Modifications

(1) If you need to slow the game down add 24 FOR DS = 16 20 : NEXT DS. The delay figure of twenty can then be adjusted up or down to find your most comfortable speed. (2) To make an Autorunning version just add these lines:

12000 CS42696 "FLEEF", 197, 17000,0
12000 FORS 20,00 : FORS 20, 194
12000 SECURE 200,10
12000 RUN

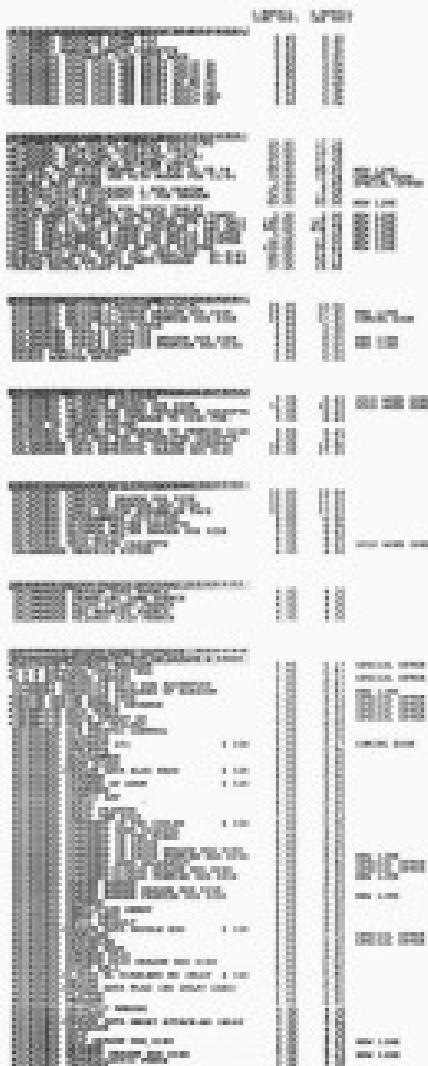
To save, type RUN 12000.

To load this version you must use CLOAD/M, since the subrun works by saving the whole program as a machine code file, with the hex Pokes to various "End of Basic" pointers (we have deliberately over-estimated the latter in case you accidentally type in more spaces than intended), making the program slightly longer than us intended. It is best to still keep a tape of the normal version as a back-up copy.

(3) If you feel you need alter the keys used for control then you must also change the string ZCOM in Line 10 to the same letters, otherwise demo mode will not work at all.

(4) This program will work on the Dragon 64 if you change USP/R00 in the DS to USP/R.

Ready-typed versions of this program (including an expanded autorunning version of one size) are available for £2.00 from J. Rogers, 11 Canterbury Road, Walton, Liverpool, L9 1BB.

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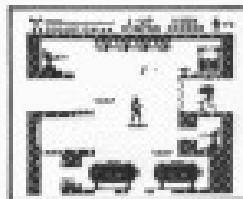
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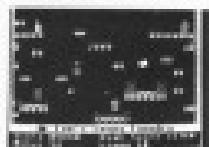
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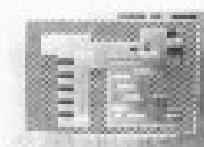


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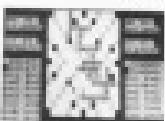


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Machine code for humans

Part One of a massive opus by Jason Orbaum et al

MANY people originally bought a computer "to learn to program", and, after toiling at the BASIC manual, gave up and played a few games. Anyone involved that, however, undoubtedly owns a Spectrum, so this series will be aimed at those with a reasonable knowledge of some sort of programming language, but no initial knowledge of the ins and of the Dragon, or the BBC microcomputer at its heart. Hopefully, they will have avoided agony through the complex pitfalls of assembler programming for a few months, even the most dedicated high-level language programmers will want to give it a try.

We will also be presenting a few complete programs, maybe one or two initial ones among the games! These will be given as complete source listings, so they can be used as tutorials, and to this end they will all be fully documented.

The beginning

Before we progress, who are we and why do we feel qualified to teach you? We have been programming in machine code as a team for several years now, including covering the same range of computers from ZX81's through Dragon and BBC, up until past IBM and Apple PCs, to Prime microcomputers. This experience also covers a wide variety of languages, although we rarely use anything but assembler through choice (our experience covers Commodore BASIC, Pascal, Logo, and C, so we are not just a pair of choice bishoppers!). The name Jason Orbaum may ring a bell in the dim recesses of your mind as one of the magazine's reviewing team. If so, then you will know our objectives in program construction, and will also know that we believe that a piece of code is nothing without a firm and workable initial design.

Starting very shortly and running parallel with this series will be a series of articles on the subject of writing adventures in machine code. These should be kept by beginners as they will be invaluable when this series is complete. That series will not attempt to teach machine code; it will, however, provide a few examples of code in use and firm grounding in design beyond the basic techniques of flowcharting we reintroduce next month.

Most people think of this sort of programming as machine code, some call it assembler or assembly language, still others call it pugnacity, but they are all the same thing (pejorative pugnacity) that is which is something totally different and much more unpleasant. An assembler is a programming aid for converting a form of the code we can understand, the mnemonics, to a form the computer can under-

stand, the machine code. An assembler is not strictly necessary — for instance, Cosmic Crusader from Biggs Software was written without one — but it will make things infinitely easier, and cut down development time a lot.

Choice of assembler is largely down to personal taste. Most of the programs for this series were written using Chocoder20 from Premier Microsystems, nice, steady classical, which uses the standard Dragon BASIC editor. Others are quite acceptable, but it is a good idea to get one that can assemble source files from tape (or disk), as having the source code in memory can take up a lot of space, limiting the size of the final program to a few Kbytes. The Dreams editor from Dragon Data is a good example of this, the program in that case being limited to about 24. All right for small programs, but unsuitable for big projects, although a few of the programs we'll be presenting first saw the light of day in a Dreams editor parameter. There is an updated version of Dreams, called Chocoder20, which is rated by many as the best assembler, and runs under DragonOS.

Many people artefactual assembler, claiming it is difficult to write in, and not worth the effort. It is true that every day there appear more BASIC compilers, or versions of Pascal that can perform benchmarks 10 per cent quicker, or with 10 per cent less code, but nothing will ever beat machine code for speed of execution and compactness of code. Any interpreted or compiled language (machine code is not compiled, remember what the local BASIC expert tells you) must by nature be slightly generalized, and therefore slower and more bulky. With machine code, the programmer has ultimate control over when it processes, and any inefficiency must be down to programmer error or a constraint imposed by the designer of the processor. This also makes assembler one of the most satisfying languages to write in. It is also possible to do anything the computer is capable of in assembler, including boozing the SAM chip — there's that later, whereas most high-level languages stick to a standard of one part or another. The day the International Standards Organisation gets an ISO9000 assembler, we can all buy Commodores and naffie down to play games for the duration of our retirement!

Rpm calls

Another part of assembler programming is the circuit; there is to discover about the memory bus. There is a lot of memory used by the system for various purposes, which an assembler programmer can use to make the Dragon sing (literally! Who knew...). This can also lead to some

particularly spectacular crashes. As most programmers find out very early on in their association with assembler, the real bus is not always the core — all in is in BASIC.

Machine code is composed of a set of relatively simple instructions, covering simple arithmetic, memory access, and a few hardware functions for interrupts, etc. The secret is that the Dragon uses a very powerful 16-bit processor, running more so than the humble 8080, and significantly more so than the reasonably refined 6800. This is due to the fact that, although technically an eight-bit chip, most of its internal structure is that of a 16-bit chip (as opposed to the Zilog 68000, which actually call a 32-bit processor, although it is in fact an eight-bit device with twice above its address). The new processor are defined as basically down to the size of the address bus, which is the part of the chip that carries the address to be operated on. If this is eight bits (binary 11111111 binary, or 255 decimal) this is because the address bus in two parts, a high byte and a low byte.

Next month we will launch into how-churring and also describe the internal architecture of the 6800.

Glossary

Address Bus: The address bus is one of the processor's path of communications to the outside world. It is used to transfer addresses to the rest of the hardware, and so the size of the address bus dictates the size of memory the processor can access. Bits: Binary digit. As most computer users will know, or tell you, computers work in binary, or base two, just as humans work in base 10. Don't, however, let this lead you to believe that machine code programmes are limited to using the digits zero and one, as the computer processes only two fingers. A bit is therefore either a one or a zero.

Byte: A byte is a number, the maximum value of which is dictated by the computer used. In most cases, a byte is from 0 to 255 (or -127 to 128). This is a function of the memory chips used, rather than the processor, and therefore varies little from machine to machine. A byte consists of eight bits. **Data bus:** Similar to the address bus, except that the data bus is used for data. **RAM:** A nibble is four bits, or four groups half a byte. From this last it might be expected to hold any value in the range 0-15. Wrong. A nibble can be in the range 0-15. Look at the definitions for bit and byte, then work it out.

Continued next month

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The Logical Dragon

The elements of an expert system by Peter Whittaker

THE DEBATE over just exactly what 'intelligence' is has gone on for a long time, and as yet there is no sign of an answer in sight. However, computer programmers have not waited for the answer to start exploring the fascinating area of intelligence on computers. Instead, they have decided upon a definition of intelligence which suits them, and then gone on to experiment with it. They say: "If a machine can behave in such a way as to be indistinguishable from a person, and if the person can be said to be intelligent, then so too can the machine." It is from this very practical position that we shall start.

One of the biggest problems computers have in imitating intelligent behaviour is their inability to understand English. They do not of their own accord remember what you tell them, and use the information thus gained to help them to make new conclusions for themselves. A prime example of this is in the use of syllogisms. Syllogisms are deductive arguments which take the following form:

'A' is a 'B'

'B' is a 'C'

Therefore 'A' is a 'C'.

For example:

Peter is a man.

A man is an animal.

Therefore Peter is an animal. The first two lines are propositions, giving us the raw data to work with, and the third line is the conclusion based upon the first two statements. The conclusion is itself a new fact, previously unknown.

I have written this program to handle just such deductive arguments. The program may best be explained by running it. When the prompt appears, type in the statement: 'A student is a layabout' and press CR/DY/DY. This is accepted by the program in Line 40 as AD. Nothing happens to AD until Line 100, where AD initial 'as an AD' gets removed. This should bring the subject of the sentence (student) to the front. Then Lines 100-105 remove the verb from the middle of the sentence. This leaves the subject and object standing alone, to be read into CB₁ and CB₂ (Line 210 CB₁='student' CB₂='layabout').

This new information is then stored in an array. Lines 240-260 check to see whether the subject CB₁ has been encountered before. If it has, then it will be recorded as a heading in the array (Line 260). If it has not been recorded in the array, then it is placed at the top of the first available blank column (Line 265). The program now checks down the column of entries under the subject, to see whether it has already been linked with the object (Lines 290-2-40). If the object cannot be found, flags added to the bottom of the list (Line 290). Having stored the statu-

in its array, the program now returns to Line 40 to await the next input. Type in 'Peter is a student', and the program will go through the same steps.

Having set up a database with the program, we can now start to examine the information we have stored in it. The test method is to list out the data under subject headings. Type 'Subject' and when the computer asks which subject, type 'Peter'. Under this heading we will find the entry 'student', and if we haltereered 'student' we would have found 'layabout'. The link between the two is obvious to us, but will the computer notice it?

Searching

This brings us onto the second, and more interesting, way of questioning the database. Questions asked need to be of the form: "Is 'A' *an* 'B'?" (e.g. 'Is Peter a student?'). Once again, this is accepted as AD by Line 40, but this time the AD is *Was*, at the start of the question gets detected by Line 80/180 and the program jumps to the question handling routine at Line 260. Here the question is chopped up to extract the subject (CB₁) and the object (CB₂). The program then proceeds to search its database to increasing depths for a link between the two.

The first search is only one level in depth, and the program is not trying to discover new links between various pieces of data, but looking to see whether it already knows the answer. The program scans along the top line of the array trying to find the subject (Lines 480/500). If it cannot find it then the search is terminated, a 'No stat' message is printed, and the program returns to Line 40 to await the next input. If the subject is found, then the program scans down the list of objects listed under the heading trying to find a match for the object in the question. If it finds a match then it prints 'YES' and returns to Line 40; otherwise the program moves on to search a level deeper.

The second level search (Lines 580-780) is which is the true equivalent of the syllogism argument, starts by finding the subject in the top line of the array, as for the first level search. Then it works its way down the list of objects listed under this heading. However, this time, instead of looking for a match with the sought for object, the program uses each object in the list as a new subject, and searches along the top line of the array to see if there is a column under this new heading. If there is, it then looks down this column searching for a match with the question object. If it finds a match it prints 'YES', and copies the new information to the bottom of the subject column, and then returns to Line 40 to await the next input. In

this way the program can expand its knowledge database for itself. If it doesn't find a match, it looks up the list stored under the next item in the original subject heading list. This continues until the program has examined all of the items in the subject heading list. If this happens the program moves on to search yet another level deeper.

The third level search (Lines 780-1080) goes one stage further than the usual syllogism argument. A is to B is C is to D. Therefore A is D. Again it does not immediately look for a match, but uses each item in the subject list as a new heading to search. It then uses the items in the new list again as new headings, and only when it encounters items in this list that state the program looks for a match with the question object. As with the second level search, when the program finds a match, it updates the information in the original subject list.

The "learning" process of this program can be examined using the 'SUBJECT' command. If we type 'SUBJECT', and then answer the prompt with 'ALL', the program will list out all of the information stored under each of the subject headings. Under Peter we will find 'student', and under student we will find 'layabout'. Now let's ask the computer to find the relationship between the two. Type 'Is Peter a Layabout'. The program will do a level one search and not find a link. Then it will do a level two search, and find the link (student) between the two terms, and print the answer 'YES'. If we now examine the database by subject again, under Peter we will find 'student', but we also find the new information 'layabout'.

Deduction

The program has added the result of its deductions to its knowledge base. To help us check up on the program's logic, it generates out the rules it follows to reach its conclusions. (Peter --> Student --> Layabout) Further, the program does not require an exact match to deduce a link. If we can find a partial link it will accept it. (eg. Searching for Man and finding Human will still produce a 'YES' response.)

The LOAD and SAVE options (Lines 1080-1085 and 1280-1290), called by 'LOAD' and 'SAVE', are set up for disk, but can easily be converted to work with tape. They assume that the data file will be called 'SYLLOGISM' but this can be easily altered if you are going to convert the program for tape, and delete the error trap at the end of the program. Try experimenting, and see what links your Dragon can deduce between different pieces of information.

Ray Coates
presenter

BEAN STALKER

What about the parts the story believes wouldn't really affect all us Christians, everything was bound to be larger than life. Jack would have come across Christian-based books and movies as well as great videogames which changed, or will, toward more God-honestly image in them search for human prey.

In this up-to-date version of the well-known story, can you guess Jack as he collects golden eggs, bags, keys and more? "Quack! Quack!" Help him to navigate the treacherous spider's web, stacked plates and to swing across vines and chains in his quest to break the top. Choose him which items to use and which bunches of dried-up bananas throughout.

£7

1000000000



A WILHELMUS BOEK, Utrecht, 1922



Disk utilities

Program: Disk Utilities, Ian Ellington, 11 Wharfedale Gardens, Balsall, Shropshire, West Midlands SY2 7EP
Price: £10

DISK UTILITIES is a collection of 12 programs, some of which will be useful to any Dragon3030 owner. All of the utilities are entered from a main menu which is called up by typing **RUDM**. The menu is displayed in a very readable 40 column display and selection is made by moving the cursor line to the required utility and pressing **Enter**. Most utilities then require you to press **Enter** again, although no input is required.

The first utility is to seek a copy of the directory in the printer. I have commented before that this can be done from basic with **POKE 111,254,CHR**, so the disk space could have been used for more useful utility here.

A more useful option is **Disk View**. This allows any sector of the disk to be viewed, using the cursor keys to step forward or backwards a block or sector at a time. The sector is displayed as ASCII characters at the top of the screen. My only complaint here is that there is no option to dump the sector as **HEX** codes.

Four separate utilities provide utilities to be copied from disk to disk, tape to tape, tape to disk and disk to tape. This will sound very promising until I found that the only files which could be copied of any of the utilities are binary files which load above address 7000. The program will not copy basic or data files. Again these are potentially very useful utilities, except by themselves.

Perhaps the most useful program on the disk is the one which recovers accidentally **KILLED** files, providing nothing has since been written to the disk. This utility allows any file to be recovered and gives you the option of Protecting the recovered file.

Another well implemented utility is the Sector Editor. Any sector may be loaded in and edited using the cursor keys. Bytes can be changed either by entering the ASCII character or the ASCII code. The ASCII code of the byte under the cursor is also printed

which is essential for identifying non-printing characters. The most common use for the sector editor would probably be to change lowercase on the directory track directly (possibly useful for just the names), or, used in conjunction with the **Disk View** option, to locate the required sector of a program and to change it directly, although this can be potentially fatal.

An option which looked very useful was **Disk Mon's Creator**; this purports to create a menu program on any disk enabling you to load any of the last twelve programs on the disk by a single key press. Unfortunately, all my attempts to use this utility consistently resulted in the program crashing with **PTP** error — so much for the "user friendly" promise.

The final couple of utilities included allow a cassette disk to be saved and loaded from tape. One side takes about 20 minutes to transfer to or from tape, and as cassettes are cheaper than disks this is an economical way of backing up data for safety — providing you can stand the wait!

Apart from the few annoying features of this disk, such as not being able to return to the main menu from any of the utilities and the fact that error messages are not explained — **DISK ERROR** is all you get — this is a genuinely useful set of utilities for any game owners. It is a shame that there is no option to use two or more drives, which would allow a lot of disk swapping.

Unlike Dominic's **Disk Doctor** program reviewed in the September issue of **Dragon User**, there is no utility to automatically recover damaged programs — you'll have to do this manually using the Sector editing option. However, at £10, this offering is considerably less expensive than Dominic's.

Brian Dodge

BACK IN the days of tape when the C64 was just a novelty somewhere in Sir Oliver's anatomy there was a computer called the Z80-1 for which reviews used to go somewhere like this:

"I cannot review this game as I cannot get it to load due to the bad loading system on the computer. However, it is described by the manufacturer as..."

"Hey! Guess what? A touch of nostalgia! I can't get **Atari War** to load either. At least not more than once. But that, I'm told to say, was enough! I'm not actually that bad at **Atari**! It took me three cassette recordings to get **War** to load and now it has given up altogether!"

The game has aspirations to be a play by mail game. It runs in 32K without the need for loading and saving of data except at the end of a game!

This is the equivalent of me saying "I want to be **Rambo**! I have a machine pistol and can carry three potatoes at a time!"

Play by mail games are big. They have to be, otherwise no one would be interested in them after having waited two weeks since their last move. This game is not big.

To play this game by mail would also require appropriate **HD**. The data recordings of this dragon, especially through **HD**, are notoriously bad and it is liable to save the game after every move would be a nightmare!

When the game did eventually load it was, as I've said, an immense disappointment as it was written, it seems, in BASIC and runs very slowly.

The instructions appear to have been written by someone who has never actually played the game, as in play they were about as useful as the Paul Man copyright Hello Aland!

For example: "If a keybody and occupies the same location as the cursor you will enter 'Control mode' for that unit. The cursor will change from its green/blue version to red/green/red."

The "cursor" described is a pair of pixels set three pixels apart on the **PICLOAD** screen and the colour change appears to be totally incomprehensible! The manual goes on to say how the mathematics of conflict is to be by the computer and then tells you what the computer is doing, in case you

want to do it on paper.

The game cannot be played solo as both my sister and myself were forced to play this appalling street far far too many hours as a test.

— Jason Orbaun

It's just a must

Book: **DRAGON3030 Programmer's Guide**, Groveside Software, 29 Gloucester Road, Teddington, Middlesex TW10 5RS. £25.00

Price: £2.99 inc p&p
IT HAS always been difficult to get detailed information regarding the Dragon3030 hardware and software — until now that is. Groveside Software, better known for their excellent **Assembler** editor has released a 12 page booklet entitled **Dragon3030 — A Programmer's Guide**. The book is not for the beginner, but will be invaluable to the seasoned machine code programmer.

A memory map of the 605 locations used in page six is given (this does not give locations used for commands such as **AUTO**) as well as all the page zero locations used to store track and sector numbers and, very detailed information is given regarding the layout of Directory entries — useful for writing programs to say **UPNAME**.

All the entry addresses of useful routines are given, such as **READ** and **WRITE** to a file, **KILL**, **PROTECT** and **PRO-MATE** is the. Each routine is clearly documented with entry and exit conditions and there are a couple of useful example programs listed at the end of the booklet.

Finally, there is a short section on known errors in the Dragon3030 ROM. However this is not as extensive as the article in **Dragon User**, May 1985.

At just £2.99 inc p&p this booklet is a must for any Dragon3030 owner with an assembler.

It is also the perfect size to fit in a Christmas stocking — and will ensure quiet silence over Christmas!

— Brian Dodge

It's war!

Program: **Atari War**, GP-Guardians, 18 Fetherbridge Road, Preston, Weymouth, Dorset DT3 6BD

Mixing it with Basic

Pam d'Arby shows how to pass values between Basic and machine code routines

THIS IS not exhaustive but seeks to demonstrate, using simple techniques, how to access data commonly between BASIC and machine code routines.

1. Use EXEC

David USP in favour of BASIC. This overcomes problems caused by known ROM bugs and techniques used in passing parameters using EXEC would be required anyway if it is required to pass more than one officially allowed parameter when using USP.

2. Use EQUATES

Set up the address of machine code routines in variables at the beginning of the BASIC program and use the variable names rather than addresses themselves within the main body of the program.

e.g. 20 BANG=29314 REM sound of explosion

208 EXEC BANG

309 EXEC BAND

This is the equivalent of using Equates in machine code with its great associated advantages:

(1) it assists in maintenance such as if the address of the machine code routine is altered, only the easily found line near the beginning of the program needs to be amended, avoiding a hunt through the entire program for every reference to the amended value.

(2) it assists in coding economy as use of a nominally meaningless NAME or LABEL for strings of digits such as machine code routine addresses is least likely to lead to transcription of characters or misspelling as with numbers alone.

3. Parameters

Whether using USP or BASIC, passing of parameters between BASIC and machine code has the same end result — data is passed by BASIC all in place in memory that the machine code can put held in a form that it can use and vice-versa.

4. Parameter storage area using EXEC

Structure machine code routines thus

parameter storage area POKE'd	POKE'd and POKED'ed by BASIC programs
--	---

RTS

The first instruction could be a short unconditional branch if the storage area is less than 128 bytes long but by standardising on the use of a Long Branch, which takes up one additional byte of memory, you are not limited and so do not have to change it when that cost additional byte of storage added to the total size. Perhaps, more importantly, an area of potential confusion is avoided in the BASIC programs if the parameter area always commences at the machine code routine address +3.

5. Dragon numbers

Often a difficult concept to grasp is that although Dragon machine code is very powerful, at its bare bones level, it actually deals only in Whole or Integer numbers, as opposed to fractions. The range of numbers it can deal with in a single instruction is 0 to 65535 and the numbers are only ever positive (known as unsigned numbers), and 0 to -32768 if the numbers may be positive or negative (known as signed numbers). This may seem limited but most home micros can only deal, at this level, with values in the ranges 0 to 255 or 0 to -127, -1 to -128! Larger numbers and fractions are possible by programming techniques, that is, by dealing with the values a byte or two at a time.

Dragon BASIC contains more truly to many experts' opinions of how a BASIC language should handle numeric values than many other of today's variants' BASICs in that to it, a number is just that, a number. That covers an amazing range of possible values (-32768.32768 to +32768.32768) as whole numbers alone can be printed normally on the screen).

It manages this by holding its numbers, regardless of the value involved, in two bytes of memory in a format variously referred to as Real, Exponential or Floating Point. This enables values in the range 1.1E-128 to the power of plus-or-minus 30 to be available to BASIC programs before it runs out of puff and gets an 'Overflow' error.

BASIC ROM is after all only machine code. To carry out arithmetic on such numbers requires them to be converted using available machine code instructions to a form that can be handled by the available arithmetic instructions, carry out the arithmetic function and convert these back into their five-byte Real format.

6. Numeric parameters using USP

I have not experimented with them as cannot rough for any other limitations such as dealing with negative values, but it appears that the recommended BASIC ROM routines associated with the USP routine for converting BASIC numbers to a form usable by machine code (ROUTINE OFWORD) copes only with the range of whole numbers 0-65535 (My thanks Brian Casper's Firmware articles did assist here). Guidance in using these routines also starts using the word Integer in its usual computer context of mapping a Double-Byte, sometimes called Word, unit of storage (a pair of adjacent memory bytes), rather than the English context as used so far in these pages of Whole number. For clarity, I shall use the words Whole or Double-Byte as appropriate.

7. Numeric parameters using EXEC

Anyone wishing to process fractions or whole numbers outside the bare bones signed or unsigned range in machine code will find the answer in these pages.

Passing numeric data to machine code

To put the parameters (<data>) into the machine code parameter area, POKE is used. POKE deals with a single byte of data at a time, automatically converting the value involved from its internally held five-byte Real format to a single byte providing that no attempt is made to POKE a value other than a whole, positive number not exceeding 255 (see an PC error occurs).

Unsigned single byte parameter

If an unsigned single byte value (<data> 255) is involved, it can be passed across directly such as shown in Fig 1.

Signed single byte parameters

The value range of each byte is 0 to +127.

-1 to +128. As far as machine code is concerned, it is not bothered about the CONVERTS of a byte. It is the way that we treat it in our coding that determines whether it is being used as a signbit or unsigned remainder, or even as an ASCII character. To the machine, a byte containing \$A1 is a byte containing \$A1. To us, it may be the decimal value 65 or the character 'A' being output to the screen or printer. Similarly, a byte containing \$FF is passed to the machine. To us, it represents the unsigned value 254 or the signed value -2 depending on the context.

Thus, when we have a negative number in BASIC, to pass access to machine code, adding 256 to it will create the PEEK/POKE 'positive complement'.

For example, -2 can be POKEd directly in either of the following ways with identical results:

```
POKE P1,$FF
POKE P1,254
POKE P1,256+(-2)
```

(Fig. 1, 2 and 3 from top)

A variable containing a signed value can be safely dealt with thus: IF N=8 THEN POKE P1,256+N ELSE POKE P1,N

Unsigned double byte parameters

Double byte unsigned values (range 0-65535) need to be POKEd into the parameter area a byte at a time, manipulating the value to ensure that each POKEd stays within the 0-255 range. The most significant byte (lower address) of a double byte storage location contains the number of ones in the value and the least significant byte contains the remainder. This can be easily achieved thus:

```
POKE P2, INT (N/256)
POKE P2+1, N AND 255
```

Use of POKEd loops off any remainder from the division. Dabbling with machine code, the AND 255 can probably be recognised as the equivalent of the machine code logical AND (ANDA/ANDB) 255-F instruction, and neatly isolates the value in the

least significant byte of a double byte value. As with single byte negative values, double byte negative values need to be converted to their 'positive' equivalents, this time by adding 65536 to the value. A temporary variable is used (TEMP) for clarity.

```
IF N<0 THEN TEMP=65536+N ELSE
TEMP=N
POKE P2,INT (TEMP/256)
POKE P2+1,(TEMP AND 255)
```

Receiving numeric data from machine code

On return from the machine code routine, the corresponding PEAK process needs to be used.

Single byte numbers N=PEEK(P1)
If the number is signed, add the line IF N<-128 THEN N=N-256

Double byte numbers N=PEEK(P2)*256+PEEK(P2+1)

Similarly if the number is signed, add the line IF N>2567 THEN N=N-65536

8. String parameters using **USR**

This appears to be an area particularly affected by ROM bugs.

9. String parameters using **EXEC**

As with numbers, an understanding of how BASIC deals with strings is necessary if other than simple manipulation is required. Such information is not to be found in these paragraphs.

Locating the string data

Each different variable that the BASIC program encounters while the program is running has a five-byte-control block set up for it. For Numeric variables, this control area contains the value itself in its first field. For String variables, this five-byte area is known as a 'String Descriptor' and it contains four items of information. Two of the items are of special interest when accessing the string in machine code. They are the Length of the string and the Address that the string data actually starts at in memory. The Length is in the first byte (byte 0) of the String Descriptor and the Address is in the third and fourth bytes (bytes 2-3). These values are already in machine code format so no further conversion is to be made within machine code routines.

The first stage in passing string data to machine code is to obtain the memory Address of the String Descriptor for the required string variable. This is acquired using **VARPTR**.

ADDR=VARPTR(NAMES)

The variable that the address has been placed in, ADDR, is a standard BASIC numeric variable that is in the five-byte-real format. Its content (or the address of the string descriptor) falls into the category of being a single unsigned register in the range 0-65535 as can be passed to the machine code routine in the manner previously described. (see Fig. 2).

The machine code routine can now locate the string data and its length.

LDA 55DPTR,PD ;get address of NAMES descriptor into Reg X

BASIC	Machine code w/ address
40 LET A=255	LDAA LDATA,PD
50 FOR I=1 TO 255-PD+1	LOOPB #PD,2
60	LDAB #PD,2
70	LDAB #PD,2
80 POKE P1,"value"	POKE
90	LDAB #PD,2
100 POKE P1,255	POKE
110 :FOR I=1 TO 255	LDAB #PD,2
120 :NEXT I	LDAB #PD,2
130 :NEXT I	LDAB #PD,2
140 :NEXT I	LDAB #PD,2
150 :NEXT I	LDAB #PD,2
160 :NEXT I	LDAB #PD,2
170 :NEXT I	LDAB #PD,2
180 :NEXT I	LDAB #PD,2
190 :NEXT I	LDAB #PD,2
200 :NEXT I	LDAB #PD,2
210 :NEXT I	LDAB #PD,2
220 :NEXT I	LDAB #PD,2
230 :NEXT I	LDAB #PD,2
240 :NEXT I	LDAB #PD,2
250 :NEXT I	LDAB #PD,2
260 :NEXT I	LDAB #PD,2
270 :NEXT I	LDAB #PD,2
280 :NEXT I	LDAB #PD,2
290 :NEXT I	LDAB #PD,2
300 :NEXT I	LDAB #PD,2
310 :NEXT I	LDAB #PD,2
320 :NEXT I	LDAB #PD,2
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370 :NEXT I	LDAB #PD,2
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400 :NEXT I	LDAB #PD,2
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2740 :NEXT I	LDAB #PD,2
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3080 :NEXT I	LDAB #PD,2
3090 :NEXT I	LDAB #PD,2
3100 :NEXT I	LDAB #PD,2
3110 :NEXT I	LDAB #PD,2
3120 :NEXT I	LDAB #PD,2
3130 :NEXT I	LDAB #PD,2
3140 :NEXT I	LDAB #PD,2
3150 :NEXT I	LDAB #PD,2
3160 :NEXT I	LDAB #PD,2
3170 :NEXT I	LDAB #PD,2
3180 :NEXT I	LDAB #PD,2
3190 :NEXT I	LDAB #PD,2
3200 :NEXT I	LDAB #PD,2
3210 :NEXT I	LDAB #PD,2
3220 :NEXT I	LDAB #PD,2
3230 :NEXT I	LDAB #PD,2
3240 :NEXT I	LDAB #PD,2
3250 :NEXT I	LDAB #PD,2
3260 :NEXT I	LDAB #PD,2
3270 :NEXT I	LDAB #PD,2
3280 :NEXT I	LDAB #PD,2
3290 :NEXT I	LDAB #PD,2
3300 :NEXT I	LDAB #PD,2
3310 :NEXT I	LDAB #PD,2
3320 :NEXT I	LDAB #PD,2
3330 :NEXT I	LDAB #PD,2
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3350 :NEXT I	LDAB #PD,2
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3370 :NEXT I	LDAB #PD,2
3380 :NEXT I	LDAB #PD,2
3390 :NEXT I	LDAB #PD,2
3400 :NEXT I	LDAB #PD,2
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3480 :NEXT I	LDAB #PD,2
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3670 :NEXT I	LDAB #PD,2
3680 :NEXT I	LDAB #PD,2
3690 :NEXT I	LDAB #PD,2
3700 :NEXT I	LDAB #PD,2
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3740 :NEXT I	LDAB #PD,2
3750 :NEXT I	LDAB #PD,2
3760 :NEXT I	LDAB #PD,2
3770 :NEXT I	LDAB #PD,2
3780 :NEXT I	LDAB #PD,2
3790 :NEXT I	LDAB #PD,2
3800 :NEXT I	LDAB #PD,2
3810 :NEXT I	LDAB #PD,2
3820 :NEXT I	LDAB #PD,2
3830 :NEXT I	LDAB #PD,2
3840 :NEXT I	LDAB #PD,2
3850 :NEXT I	

Continuation page(s):

LDA 0,X : get length of MACD\$
Int Reg A
LDY 2,X : get address of start of
actual name into
Reg Y
LDI 0,Y : get the first letter of the
name into Reg D
etc.

Assemblers equipped to deal with indirect addressing can achieve the same result with fewer instructions. Alternatively, further PEEKs and PCRs in BASIC can extract the Length and Actual String Data Address from the String Descriptor and set it up directly as parameters for the machine code, etc (where P1 and P2 are as in previous examples).

POKE P1,PEEK(DADR) REM string length
POKE P2,PEEK(DADR)+2 REM most significant byte of actual string address — it doesn't need 256 conversion as it is not a standard BASIC variable but a machine code token double-type.

POKE P2+1,PEEK(DADR)+3 REM least significant byte of actual string address — doesn't need AND 0ffh mask etc, as above BASIC 6.0.

There is no way of doing anything other than programming:

Setting up new strings for BASIC from machine code

In BASIC, define a 'target' string variable set up to the length, if known, else maximum possible length, of the string to be set up in the machine code routine.

Depending on how you want to deal with

it on its return to BASIC, if it is a variable-length string fill it with space characters or recognise 'end of string' characters, e.g. MOCDD\$=55HFF000000H"."

Create the string variables descriptor address, pass it down to the machine code routine, set up the actual string data and return to the BASIC program. The string is then available for instant use in BASIC.

Adjusting variable length strings

If a shorter than maximum-length string has been set up, it seems that no harm will come in physically amending the Length type in the String Descriptor in the new actual string length.

However, to get on the side of caution in the early stages is sensible, so get BASIC to adjust the length field itself in one of two ways — either pass back to the BASIC as a separate numeric parameter the actual length of the string we set up in the machine code or indicate the end of the string of data with an arbitrary 'end of string' marker byte as is most convenient from the programming point of view. BASIC can then adjust the string length accordingly thus:

1) Using a Length parameter (see Fig 3).
2) Using String End Marker.
An example except to infinity to the savings with what will be the end of string marker: 00 MCS-55HFF000000H,".".

On return to BASIC, the MCS length can be adjusted thus:

250 TCDP=(MCS\$)LMCS,"."
251 IF TEMP>0 THEN MCS=LEFT\$(
MCS,TEMP)

(If TCDP was 0 no 'end of string' marker
was present.)

was found as the string was filled to its currently set maximum that needs no adjustment.)

10. Relative parameter addressing

Give Labels names to the parameter fields in the machine code area and refer to the fields by Label within the code. This greatly reduces maintenance if fields are altered as re-assembler automatically adjusts the addresses, avoiding searches for references to fields where they may be a knock-on effect.

Similarly, define the addresses of the parameters in variables at the beginning of the BASIC program 'relative' to the address one and as in the small examples above. Should, say, the size of a parameter near the beginning of the area be changed, a whole list of addresses do not have to be amended, for example:

40 L1=250000

50 P1=L1+3

P2=P1+2

P3=P1+1

P4=P3+2

This shows that P2 starts at the address two bytes after P1, P3 starts one byte after P2 etc.

Should the length of P1 be reduced to one byte, using the 'relative' method of addressing, only the P3 address needs to be altered (to P3-P1+1) and the other addresses will be automatically computed correctly saving much potential maintenance.

The fewer the opportunities of making errors, the better!

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Firmware

This month we look at the Miscellaneous Firmware locations and routines. These are those not already covered which do not fall into any particular category, but which may be of use.

Miscellaneous Firmware Data Locations

- 25-26 Start address of Basic program.
- 30-34 Address of top of machine stack.
- 39-40 Top of Firmware RAM.
- 41-42 Line number used in COnTinue command.
- 43-45 Temporary general purpose line number store.
- 47-48 Direct mode command text pointer.
- 184-185 Current line number (000000 in direct mode).
- 186-187 Physical end of RAM.
- 188-189 General purpose 16 bit scratch pad.
- 157-158 EXECUTE entry address (initial points to routine giving an HF error on power up).
- 186-187 Address of current significant byte of current command.
- 176 TRAPnTHREE flag — now zero-state on.
- 178-179 Address of start of USB address space.
- 201-202 PERNUMBER increment value.
- 208-210 PERNUMBER start line number value.
- 211-212 CLOADM 2's complement load offset value.
- 213-214 PERNUMBER new start line value.
- 215 Editor line length — not user variable.
- 274-275 Current value of system TIMEH.
- 277-281 Random number seeds used by RAND function.
- 288 Number of basic commands.
- 289-290 Address of list of basic commands.
- 291-292 Address of command dispatch table.
- 293 Number of basic functions.
- 294-295 Address of list of basic functions.
- 295-297 Address of function dispatch table.
- 298 Number of disk commands.
- 299-300 Address of list of disk commands.
- 301-302 Address of disk command dispatch routine.
- 303 Number of disk functions.
- 304-305 Address of list of disk functions.
- 305-307 Address of disk function dispatch routine.
- 308 Value of joystick (0)
- 307 Value of joystick (1)
- 308 Value of joystick (2)
- 309 Value of joystick (3)

Miscellaneous firmware Routines

SysErr — (Dragon 38684, Tandy 41102)
This routine generates the appropriate action for an error code in the B register.

Brian Coggs explores the Dragon's ROM in a special series which builds up month by month into a Firmware manual.

The routine resets the stack, turns the cassette motor and audio off and returns to the Basic command mode. Errors should always be cleared by entering this routine, even if it is patched by the 38686 via the System Error Trap instruction. Error numbers start at zero which is an HF error, and go up to 52 in steps of 2. Error errors start at 128 and go up to 189 in steps of two. The error codes are in the following areas: NP, SAV, PRO, CO, FC, DLY, DM, UL, BS, DD, 10, ID, TM, CS, LS, ST, CH, UT, FD, AO, ORL, ID, FML, PRO, NL, DS, HL.

CmdMode — (Dragon 38649, Tandy 41102)

Prints the "OK" prompt and returns to the command mode, all return addresses, and subsequent commands on a multi-statement line are lost.

BasVect1 — (Dragon 38623, Tandy 44321)

Sets up various necessary vectors one at a time giving an HF error on power up. A basic program has been loaded. It should be followed by a call to BasVect2.

BasVect2 — (Dragon 38773, Tandy 44271)

Completes the initialisation process after a Basic program has been loaded. It should be preceded by a call to BasVect1.

Reset Stack — (Dragon 38644, Tandy 44338)

Resets the basic stack to its initial position, all entries are lost. This routine is used as part of the power-up and error recovery procedures.

NEW basic — (Dragon 38615, Tandy 44312)

Removes the current basic program from memory (if any), resets the basic stack, clears all variables. This routine has exactly the same effect as the NEW command in Basic.

RUN Basic — (Dragon 38661, Tandy 44448)

Runs a basic program in memory. This routine is most often used to autoload basic programs after loading them from tape or disk and calling BasVect1 and BasVect2. This routine cannot be called directly from Basic.

Random Number — (Dragon 38798)
Generates an 8 bit random number and places it in location 279.

RESET — (Dragon 46004, Tandy 41096)

Resets the whole machine as if the RESET button had been pressed. The basic program and variables are not affected.

Boot Basic — (Dragon 46080, Tandy 41142)

Resets the Basic interpreter as if the machine had just been powered up and

reset. This has the effect of REWing any program in store and displays the normal sign on message.

Read Joystick — (Dragon 48466, Tandy 43486)

Updates all the joystick data locations — stored in 348-349.

List Basic — (Dragon 38522, Tandy 40945)

List the Basic program in memory to the Device whose device number is in 0790 (location 111). The Register must be zero on entry. This routine can not be called directly from Basic.

Boot Basic64 — (Dragon 48000)

Loads up the full version of Basic and puts into RAM mode. The complete routine only exists on the Dragon 64-RROM. A small portion of machine code is copied into the cassette buffer. This selects an alternative on board ROM which contains the 64k basic. This is copied into RAM at 48152 onwards and the new basic is entered. Programs are preserved, variables are cleared.

Reset D/A — (Dragon 47828, Tandy 43307)

Put the value 876 into the D/A converter address.

Write D/A — (Dragon 47800, Tandy 43089)

The A register on entry must contain the data to be placed in the D/A converter. Bits 0 and 1 should be clear.

Select JSK — (Dragon 48449, Tandy 43420)

Selects the joystick sources (ports 0, 1, 2, 3) from the A register on entry. The routine writes to CA1 and CA2.

This is the seventh in Brian's series on the Dragon Rom routines. Next month, he will be covering the area of DragonBox Firmware. If you have missed any of the previous issues, they can be obtained from Dragon User, Black Issues, 12-13 Little Newport Street, London WC2H 7PP, at £1.25 each, inclusive of postage, packing and administration charges. Just to remind you of the previous months:
Sept 85 — Cassette Operating Systems
Oct 85 — DOS Firmware Routines
Nov 85 — Text Manager Routines
Dec 85 — Graphics and Sound
Jan 86 — Variables
Feb 86 — Assorted Vectors

Cupid Cupid

More machine code action for the keyboard of Steve Gathercole

THIS GAME is all about Cupid. He has to get his practice so first of all you must shoot your arrows at the moving targets using the Emerkey. This is nice so that as Cupid does not move on this first level, but once you have shot 10 arrows you move on to level 2. In this level, Cupid's little wings are getting tired and he keeps falling to the bottom of the screen. You must press the up arrow key to stop him falling and ending the game, but don't get up too high or the game will finish.

After another 10 arrows you move to level 3 where a man and woman appear at the top of the screen. This time instead of a target you will have to hit little hearts — if you hit one from the man it will move closer to the woman. The game ends when the man meets the woman or you use 10 arrows.

For each hit of the target you will score higher for the next hit, depending on where you hit the target, in other words a bull on the head will give you more for the next hit on the target. Your hit is also indicated on a large target at the top of the screen. A simple hall of fame at the end of the game will show your relative score position.

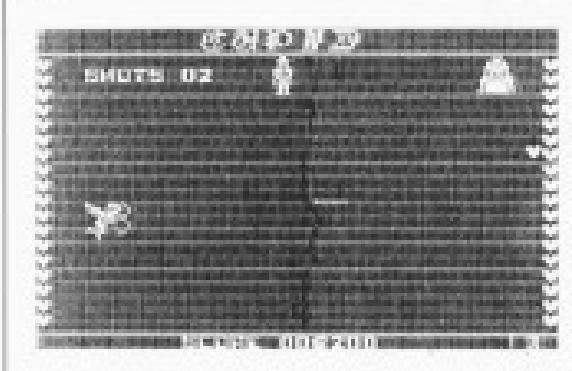
To type in the game proceed as follows. First type in Listing 1, the loader. It is the same as my previous loaders so use it again if you already have it on tape. Run it and you will be asked for the start address (0000). Type this in and Enter. You will then be asked for the finish address (0000). Type this in, then Enter.

Now you must type in the size of hex digits up to, but not including, the '+' sign from Listing 2. Press Enter and then type in the checksum (this is the number after the '+' sign). Press Enter and if all is okay you will see the next address displayed and you carry on as before until the whole of Listing 2 is finished. If you want to type in the listing in small sections, then type in the first address you want to load as then save this using COM2DISK 'CUPID' 0000/0000, where 00 is the address you finished at. Next time you carry on, the start address will be the finish address you used last time — do forget to CUDADM each part before restarting each time, though.

The whole game is saved using CUDADM 'CUPID' 20000/20000/20000, then once loaded use EM65C 20000 to start. If the game is too much to type in then I will supply a copy for £5.00. Also if you need any help or advice, then don't hesitate to contact me at 14 Hendersons Estate, Whitstable, Kent ME11 1AA. Happy St Valentine's!

```
10 CLS
20 REM HEXLOADER - ENTER THE
30 REM STRING OF HEX DIGITS FIRTS
40 REM AND THEN THE CHECKSUM
50 CLEAR 200,27999
60 PRINT"ENTER START ADDRESS":INP
UT START
70 PRINT"ENTER FINISH ADDRESS":IN
PUT FINISH
80 FOR N=START TO FINISH STEP 11
90 PRINTN;" ";
100 TT=0:INPUT A$:Z=0
110 FOR G=1 TO LEN (A$) STEP 2
120 P=VAL ("&H"+MID$(A$,G,2))
130 TT=TT+P:POKE (N+2),P
140 Z=Z+1:NEXT
150 PRINT" ";
160 INPUT T#
170 IF T# <>HEX$(TT) THEN SOUND 20
180:PRINT"ERROR - ENTER LINE AGAIN"
190 :GOTO 160
180 NEXT
```

Listing 1



MIKE GERRARD'S ADVENTURE TRAIL

OVER THE last few months I've had lots of letters from readers, generously offering to share their adventure successes by giving clues and sometimes complete solutions to games, while at the same time I've been getting letters from newreaders and adventurers asking for more hints for beginners. There is never enough space to list all the clues people send me every month, so I've decided to catch up with the backlog this time and have a bumper column of clues and solutions. As always, any information that might be too revealing will be printed backwards to prevent it being seen by anyone who doesn't want to know the answers, though some of the more general clues will be printed normally.

Beverley Looest of Norway has solved Syringe and offers the following advice:

- 1) Big ugly creatures don't like things thrown at them
- 2) Read numbers carefully
- 3) To kill Darts needs patience
- 4) Carry as much as you can
- 5) Holding your breath is a very useful exercise

More on...Syringe from Darren Cash of Birmingham:

- 1) To kill alien: TITA YZZU FWWO RHT
- 2) To get in deep pit: QMHR TSQH ALTKH MALB GRD LORH LIHW PHWU
- 3) To help in killing Darts, unplug right joystick and use left joystick, trying to keep your right sword crossing over Dart's saber.

Juxtaposition

John Baker of 108 Befopwood, Balsall Heath, Birmingham has written with lots of clues and answers on Juxtaposition, which he says he solved in a few attempts but enjoyed very much nevertheless. He enjoyed a stock, write to John with a say, but reasonable some of the following general advice might help:

- 1) Examine all objects you find
 - 2) Most items have a logical use and are only needed once
 - 3) Eat regularly—if you're weaker before the end
 - 4) Always carry your ID tag
 - 5) If right bats then get inside quickly
 - 6) Solve the game logically, as several things happen which may catch you out.
- John's also sent lots of specific answers to problems, while many readers seem to be having trouble dealing with the crowds at

the start of the game. The first droid you meet can be avoided if you don't immediately run out into the corridor, and afterwards take carefully for as apparent levers you to hide. You should be able to get over the passageway and out of the first few locations — perhaps an airshaft opens to you in bed? After that, you will then encounter another droid. To deal with this one you will need what might be called a solution:

Darren Dotley of Hastings Island has sent a few tips for the players among you. In Last in Space, for protection against the security robots you can add TIR(3)-8 at the beginning of Line 10-10 in the program. In Toesies of Death you can get yourself a permanent sword by adding U1.103-50 at the start of Line 1100, and a permanent hoveraxe by adding U1.27-50 at the start of Line 1200.

Ice Kingdom

Just to show you can solve adventures the proper way, Mr. Darren sent a few clues for The Ice Kingdom:

- 1) In the armour: SREQ ITEH TROM NORD GAEC LLUP
- 2) To get past the snowman: KOTI STM EOM
- 3) When you meet the small giant: SSELDO PENT MIRE VIG

I've received several clues from Darren Royal of London SW811, firstly on ZJ Dibbers:

- 1) The coyote is not why he seems to be
- 2) To enter the caves in the canyon: EVA CEE KAWAN EHTHM AGRD
- 3) Find the magic beans? GIV TASHI LUTN OCTI

- 4) Get a tag? LIO MIT SPID
- 5) Man with machine, a present? EBL DEPC ULDR ORHT

And secondly on Time Machine:

- 1) To get out of the park opening: RADW OCHT THWA EVEL MAUL CHTR EVEL LLUP
- 2) Generator? REHM JAHN FATH KAERS
- 3) Police-scarf? TEI ROM GI

A few months ago in the advance contact section a reader named JP Thorne was asking for help in Pharsalia Terra, but unfortunately his address was omitted. H. T. Tuck of Chichester took pity and sent the solutions in to me:

- 1) To get into the water room, go to where the walls have ears and say a word that connects the pictures on the walls that you pass off your way there. (You

almost need a clue to the clue on that one.)

- 2) To give the robot the carafe: TBB ARDE EFTI PARC
- 3) To open the telephagore: RAILED EHTH MOHP ENRUE PHUC

If there was a Norwegian Adventure Contest then Holt Michelsen of Norway ought stand a good chance of winning, as he's sent me solutions for no less than six adventures. Is there nothing else to do in Norway, Holt? I'm very grateful to him for taking the trouble to do this, the adventures he's covered being Justaposition, Secret Mission, Caverns of Doom, Time Machine, Lost in Space and Wings of War. I'll pass a few hints out of each, starting with Justaposition, where two readers have already written to me saying they've been having trouble clearing with the Neptune Droid:

- 1) Neptune Droid: ARE MAD EHTC SUCC THOM LYTHI ERS5 ETAH
- 2) Canister a problem? EET FOOS HMV SLLI PRIMI PEEL STUP
- 3) To get back across the river: TINU FREDN EBEN TESU
- 4) To disarm the bomb: GULB DEHN EERG DORE GLUB SEEP

Some of Holt's clues on Secret Mission:

- 1) To reach the ledge: RIBB FOOC FHTI WWOOD NWKA AHAB
- 2) No use for the map? TM GAPP
- 3) To get into control room: FOO DEHT KOK

In Caverns of Doom:

- 1) To open Northeast: NOT ISLE KSEH TINI IMAGE
- 2) To move reef over deep area: LLAP RETA WORL HEET ADOR KONU KOOL

3) To get rid of the large bear: PAERT ANUG ERF

In Lost in Space:

- 1) To escape the maze: KWAH WORL APGR CLD FOAM DRIP
- 2) To find cube area: EPT AEDH AENI HOMM DOOR MIKS-DETI HIRHT DSME
- 3) To open security box: MILK HARP SIDH CRNTS GAPP

For Wings of War Holt has included the following clues:

- 1) To find a cat to escape in: ECOL PEPPR RAEN STEK CARB NRUT

2) Key for car? ECOL HTW TOOB SREC ERF DRIF

3) How to do the container? RAUN RAUL AFOP ARCS DRASH CNER WESU

Steve Glantz of 36 The Mayberry, Denver-

try. Northwest NWHT 40X has already been mentioned in these pages and repeats his offer to help anyone stuck in Madness and the Minotaur. NWHT has also now sent me some more information on the game, including several maps, so I'm going to have to see how best to make use of those. Meanwhile, here's a note of the effects that various spells in the game have:

Name: PMAL SERO TSEN
Address: GHI TSH QIPR OGGS DRUG
Address: BARAC SOSE YTRIA QPN DITD
Address: POMO SSERE FPOO NHAR QHQS
LLUR
Address: ERUSA EPTN DRNF
Address: DO FHLU PRD
Address: KPMI LUSL PTNA PAUD
Address: HTMP BZCO UBLA
Address: TSE POF OTUO YOKA TOTS EMTT
BBHM TESU

I've had several letters now from adventurers in Israel, where there seem to be plenty of Dragons about, and the latest is from Dudi Menashe, a Hasidic Grocer, Chutz Haaggar 70006, Rehovot, Israel. Dudi is an enthusiastic correspondent, like all the Israeli adventurers I hear from, so if anyone would like to correspond with him (or her, I'm never quite sure with Israeli names!) then I think Dudi would like to hear from you. Particularly if you're having trouble

with Dragonian, on which Dudi offers help and a few clues:

- 1) To kill the spider: ELU SPAQENT ENVO
- 2) To save the dark room: HCT TWSE THW
SCHR FDRA DIUG ILRU OFMC HTR
KAED LLUF
- 3) Kendra flower? MOOR KRAD EHHT
HTT HALP

Dragonian has also been solved, and help is also offered on it, by Avi Tsh-Shabat, Grey-Synops 21143, street Mapo-Aviv, Tel Aviv, Israel, and if you're in the mood for writing stories and perhaps swapping

some software then contact Daniel Merker, 4 rue de Vouille, 75014 Paris, France. Daniel's interested in getting hold of some of the more recent Dragon adventures and offers in exchange your choice from his collection of over 400 arcade and adventure titles. I didn't realize there was quite that much Dragon software around.

Anyways, I hope you've found this month's bumper crop of clues helpful, and I'm sure you're grateful, as I am, for all the readers who have taken the trouble to send information in. Thanks folks.

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventurer's Helpline — simply fill in the coupon below, stating the name of the adventurer, your problem and your name and address, and send it to Dragon User Adventurer Help.

1210 Little Newport Street, London WC2H 3PF. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trail to write to as well!

Adventurer Problems

Name:
Address:

Mar '86

Adventure Contact

Adventure: Shannigan
Problem: I have gold coins, knife, shield, torch, clothes and bullet. What do I do now?

Name: Cavan Morris
Address: 19 Waverley Road, Cumnor, Oxfordshire, OX2 1SY.

Adventure: The Clockwood Incident
Problem: How to get past the White Rabbit? **Name:** Conrad Meyer
Address: 8 Colney Road, Dorking, Surrey, RH4 2AE.

Adventure: Shannigan
Problem: How to cross the deep ravine at the caves and how to find a way for the 12th note. **Name:** Matthew Mayle
Address: 49 Ferndene Drive, Buntingford, Hertfordshire, SG9 9SD.

Adventure: Thelos
Problem: Cannot get past the second spider or find a command to integrate Name/Name. **Name:** David Griffiths
Address: 16 Sandycroft Court, Newson, Devon, EX7 5GD.

Adventure: Juxtaposition
Problems: Cannot find Mencius to start journeys (have escaped the first and am on the street level). **Name:** David Griffiths
Address: 16 Sandycroft Court, Newson, Devon, EX7 5GD.

Adventure: Ring of Darkness
Problem: Everything - I need help! **Name:** Paul Venables
Address: 15 Waverley Drive,

Bolton, Old Yarmouth, Norfolk, NR9 1NU.

Adventure: The Kat Trilogy
Problem: How do I go from the mountain pedestal? I've got the sword and won the Magic Spear, but I cannot find my way any further. **Name:** V. Gurnard-Smith
Address: 4 Beacon Road, Bournville, Birmingham, B25 2LN.

Adventure: Juxtaposition
Problem: How do I get into Barn's Whistle Fort, The Pyramid, The Staff, etc? **Name:** Roger Nichols
Address: 10 Wimsey Way, Bexhill-on-Sea, East Sussex, TN4 8AY.

Adventure: Mountains of Kat
Problem: I can't convince the Cartographer to let me go to the second floor of his house. **Name:** Diane Palmer
Address: Via Molino De Pescante 72, Molino, 40131, Italy.

Adventure: Juxtaposition
Problem: How to get out of the closed city? **Name:** Stephen Sherman
Address: 11 Church Lane, Corfe Castle, Market Harborough, Leicestershire LE16 8PR.

Adventure: Styggy
Problem: Have got light sabre and Mind Transporter, but how do you use it and what do you do in the garden area? Can offer help with Juxtaposition, Ring of

Darkness and Return of the King. **Name:** Stuart Bawley
Address: 3 Stockton Close, Cheltenham Kings, Cheltenham, Glos.

Adventure: Juxtaposition
Problem: How do you get down to the balcony? **Name:** Gerard Purcell
Address: 36 Burton Lane, Newton, Sevenoaks.

Adventure: Shannigan
Problem: What is the 10 foot pole and how do you get into the cave? **Name:** Andrew King
Address: 165 Blue Acorn Clock Face, St. Helens, Merseyside.

Adventure: The Clockwood Incident
Problem: What is the no-word command which enables you to enter the bars and train? **Name:** J. R. Clinton
Address: Swan Cottages, Shrub Row, Hedingham, Hornchurch, Essex, RM12 0YD.

Adventure: Thelos
Problem: How do I get past the force field? **Name:** Lorina Tiley
Address: 14 Matlock Close, Rothwell, Northants NN14 2XY.

Adventure: Madness and the Minotaur, Ring of Darkness, Last in Space
Problem: Everything - all I can do is get killed! **Name:** Alan M. Colman
Address: 15 Eastgate Street, Warrington, Cheshire, WA1 1RE.

Adventure: Plate Adventure
Problem: How do you get from the river bank to the window? Also need help with El Dorado. **Name:** Phil Cooke
Address: 293 Upper Elmira Old Road, Beckenham, Kent.

Adventure: Juxtaposition
Problem: Many and various. **Name:** Robert Gassmann
Address: 20 Amery Road, Marwell, Dorset DT10 1LG.

Problem: How do you get to Treasure Island from Pleasure Island? **Name:** Douglas Field
Address: 14 Lissenden, Meols, Wirral, Merseyside, CH4 1JG.
KT

Adventure: Thelos
Problem: How do you pass the force field on the garden planet? **Name:** Jason Matisse
Address: 3 Ave Bridge Avenue, Sutton Lakes, St Helens, Merseyside.

Adventure: Juxtaposition
Pattern of the King
Problem: How to find Dead of Brown also how to get away with Eldred Empered? How to use the Ring? **Name:** Graham Hooper
Address: 20 Haugh Lane, Henbury, Rockdale, Lancs.

Adventure: Rat Trilogy
Problem: How do I get past the snarl in the caves? **Name:** Stuart Jones
Address: 9 Heath View Crescent, Dartford, Kent.

Adventure: Shannigan
Problem: How to get from the river bank to the window? Also need help with El Dorado. **Name:** Phil Cooke
Address: 293 Upper Elmira Old Road, Beckenham, Kent.

Adventure: Juxtaposition
Problem: Many and various. **Name:** Robert Gassmann
Address: 20 Amery Road, Marwell, Dorset DT10 1LG.

Puzzle it out!

A conundrum creator brought to you by C L Naylor

PUZZGRID will create the familiar 'find the words' in the grid puzzle from your own set of 100 words.

Initially you will be asked to input your 100 words. Naturally with the 10 x 10 grid they must not be longer than 10 letters, and it's better to input the longer words first; the puzzle will be produced in a much shorter time.

After the 10th word has been input you can watch as the computer finds places for all the words in the grid. Finally it fills all the

empty spaces with randomly chosen letters and the words are listed alongside the puzzle.

You are then given the option of a printout in the form shown in Fig. 1, creating a different puzzle using the same words, or making a completely new puzzle. If you are just doing a one-off puzzle for yourself, then of course you'll have to look away while it is being produced on screen.

The program is relatively simple. The grid is made up from a number of strings which

are then manipulated in Lines 110-280 to fit in your chosen words. A random direction and initial position in the grid are chosen and the current word is temporarily fixed for a fit. If it won't fit, this process is repeated until it does.

The entire routine is then repeated for the next word and so on until all 10 words are in. Lines 290-380 then fill the 'holes' with random letters.

The Printer command prints the final puzzle.

Find the words hidden in the Grid.
Across, Down, Diagonally or Backwards

S O T P E X P E R T	REFRESH
M E S I S T E M D L	STRIDE
A D G H S T R I D W	COMPUTER
H S L K S H D J C T	INTERED
P I R T T P S S M A	BOX
A N O R S X K Q A V	PARTY
B E D I T W R R R N	DINERS
L F R E T T U F M O C	ARLH
E B F T N E C S D N	SECRET
E F S R T Y N T N V	REFERT

Program Listing

```
10 REM PUZZGRID BY CL NAYLAR
20 REM PUZZGRID IS A PROGRAM WHICH TAKES A LIST OF WORDS AND PLACES THEM IN A 10x10 GRID.
30 REM THE WORDS ARE PLACED IN A RANDOM ORDER, AND THE GRID IS FILLED WITH RANDOM LETTERS.
40 REM THE WORDS ARE PLACED IN A RANDOM DIRECTION (UP/DOWN/ACROSS/DIAGONAL).
50 REM THE WORDS ARE PLACED IN A RANDOM POSITION IN THE GRID.
60 REM THE WORDS ARE PLACED IN A RANDOM DIRECTION (UP/DOWN/ACROSS/DIAGONAL).
70 REM THE WORDS ARE PLACED IN A RANDOM POSITION IN THE GRID.
80 REM THE WORDS ARE PLACED IN A RANDOM DIRECTION (UP/DOWN/ACROSS/DIAGONAL).
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100 REM THE WORDS ARE PLACED IN A RANDOM DIRECTION (UP/DOWN/ACROSS/DIAGONAL).
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380 REM THE WORDS ARE PLACED IN A RANDOM DIRECTION (UP/DOWN/ACROSS/DIAGONAL).
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390 REM THE WORDS ARE PLACED IN A RANDOM POSITION IN THE GRID.
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990 REM THE WORDS ARE PLACED IN A RANDOM POSITION IN THE GRID.
1000 REM THE WORDS ARE PLACED IN A RANDOM DIRECTION (UP/DOWN/ACROSS/DIAGONAL).
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MARCH PUZZLE

Gordon Lee sets the pace — and this month there are 25 copies of Quickbeam's 6809 express to be won

IT IS remarkable to think that it was only just over a decade ago that the first simple pocket calculators were making their first appearance on the domestic market. These early models generally had just the four basic mathematical functions — addition, subtraction, multiplication, and division, and consequently it was sometimes necessary to devise methods of calculating values whose functions were not present on those machines. The calculation of square roots is a case in point. Readers who are familiar with the classical "pencil and paper" method for the extraction of square roots will appreciate the complexity of this method, and will realise the advantage of an easier method of calculation. Nevertheless, the calculation of square (and cube) roots using just the four basic mathematical functions is still possible. It may be thought that this method has now only a curiosity value, but the actual technique is still applicable in solving problems in computing which do not lend themselves to other, more conventional, methods of solution. This month's competition problem may well be such a case!

But first, the method for finding square roots is as follows:

- 1) Make a rough guess as to what the square root might be.
- 2) Square this value using the ordinary multiplication function.
- 3) Compare this result with the original number.
- 4) Adjust your guess by a proportionate amount to give you a revised value.
- 5) Go to step 2.

By continuing the procedure until the square of the guess is the same as the number whose square root we are trying to find, we arrive at the correct root by a method of approximation. In actual prac-

tice, using a simple calculator, an accuracy of eight significant figures can be obtained in only five or six iterations of the sequence of operations. Mathematically, this is known as a "restoration" method of solution because the method uses each solution as a basis for a further, more accurate, assessment. In effect, the calculator is "learning" by its own mistakes.

This can be translated into the following BASIC program:

```
1 INPUT "ENTER NUMBER :R : GUESS
2 G = GUESS/GUESS
3 IF ABS(S - R)<0.000001 THEN PRINT
   "THE SQ RT OF R = ",G,": GUESS
4 S = A*(R/GUESS-R)*GUESS-GUESS/
   GUESS*G
5 GOTO 2
```

The unusual line numbering of this program is so that each line corresponds with the step numbers of the method outlined earlier. If the command PRINT GUESS is added to the end of Line 3 and the program run for a couple of trial examples, it will be noticed that each successive value computed rapidly stabilises towards the correct evaluation of the square root. The final accuracy is dependent on the mathematical accuracy of the computer, but all mathematical operations are subject to this restriction. Curiously, the accuracy of the original guess at the start of the operation is not at all critical. This guess can be wildly off without affecting the final result, the only difference being the number of iterations carried out before the result stabilises. In fact, the program listed processes with the need to input a guess as it takes as its final approximation a value of half the number whose root we wish to find.

The creation of such an interactive pro-

gram provides a method of solving the following problem posed recently by Professor Ota Hsu to some of his students:

"I have here", announced the professor, "two imaginary spheres, each one a foot in diameter." The professor stood with his arms outstretched, balancing each imaginary sphere on the forefinger of each hand.

"You will realize that the volume occupied by each sphere is a little over half a cubic foot, which will make the total volume of both spheres to be slightly in excess of one cubic foot."

"Now, if I slowly move the spheres closer together there will come a time when the two spheres begin to merge. Unlike real spheres, they do not flatten, but like ghosts, they just melt into one another, with the extra volume of the overlapping portion just disappearing."

"You will understand that, if I continue merging the spheres until they are both exactly superimposed I would be left with a single sphere with its original volume of just over half a cubic foot. The second sphere would have vanished."

"What I would like to know is, how far apart are the centres of the spheres when the total combined volume is exactly one cubic foot?"

This was the professor's problem. To solve it you will need to know that the volume of a sphere is given by $V = \frac{4}{3}\pi r^3$, and also that the volume of a spherical segment is given by $V = \frac{1}{3}\pi h^2(2r-h)$. Note that this is determined from a sphere by means of a straight cut, the great lens-shaped piece produced is called a spherical segment. In the formula r is the radius of the sphere itself, and h is the height of the segment. If it is held on its flat cut surface, the height of the curved dome).

Prize

This month we are offering 25 copies of 6809 Express from Quickbeam Software — a sort of cross between Rambo and Thomas the Tank Engine, where you must rescue your captured comrades in your locomotive. Can't be beat!

Rules

To win your Quickbeam game, you must first show the answer to the above competition, and demonstrate how you solved it with the aid of your Dragon. Please do not send in a cassette containing your program. Make sure that your name and address are clearly printed on your entry and mark the envelope "March Competi-

tion". Envelopes which do not state which month you are entering for will be disqualified.

As a tie-breaker for this month, we're asking you to finish the phrase, "The train now approaching Platform Five . . ." is not more than 12 words. Marks will be given for originality, wit and good spelling.

December Winners

This month winners get a copy of Michael's adventure game Trekkor. Congratulations go to Simon Atthey of Swindon, Mike R. Woods of Oaktree Gardens, Buntingford, Hertfordshire, Mark E. C. Hasted of Papple Road, Erith, Kent, M. Ingram of Broadgate Avenue, Luton, Bedfordshire.

Hewman of New Haw Rd, Addlestone, Surrey, Rachel Barnards of Redbridge, County, Durban, SA Mr. Stanton, Bridge Hotel, Stiles Avenue, Thaxted, Northants., J.W. Davis, Radnorshire Drive, Chesham, Cheshire.

Interesting tie-break answers (I want to visit a Dark Star because . . .), included, "because all my friends have been", "because I want to go somewhere no teacher has gone before", and "my wife told her orange egg in case".

Apologies to anyone who hasn't received their lightbulb puzzle prize recently — we've been having a spot of bother in that department. If you're one of the unlucky ones, then drop us a line and we'll pop it in the post.

JOHN PENN

DISCOUNT SOFTWARE

FOR THE DRAGON

UTILITIES

Further Utilities

Title	Publisher	Medium	R.P.P.	Price	Box
Address	Freelance	Cartr	£10.95	£5.95	□ □ □
Calculator	M.S.T.	Cartr	£10.95	£5.95	□ □ □
Business Accounts	M.S.T.	Cartr	£10.95	£5.95	□ □ □
Master Address Book	M.S.T.	Cartr	£10.95	£5.95	□ □ □
Stock Control	M.S.T.	Cartr	£10.95	£5.95	□ □ □
Calculator	M.S.T.	Disk	£10.95	£5.95	□ □ □
Business Accounts	M.S.T.	Disk	£10.95	£5.95	□ □ □
Master Address Book	M.S.T.	Disk	£10.95	£5.95	□ □ □
Stock Control	M.S.T.	Disk	£10.95	£5.95	□ □ □
MSX Basic	M.S.T. Plus Range Disk	Disk	£29.95	£14.95	□ □ □
Stock Control	M.S.T. Plus Range Disk	Disk	£29.95	£14.95	□ □ □
Graphics System	Schneider	Cartr	£9.95	£4.95	□ □ □
Label Label	Logo Times	Cartr	£12.95	£5.95	□ □ □

Latest Arrivals

Title	Publisher	Medium	R.P.P.	Price	Box
Sales/Purchase Day Book	Software	Cartr	£10.95	£5.95	□ □ □
Sales/Purchase Ledger	Software	Cartr	£10.95	£5.95	□ □ □
Calculator	Software	Cartr	£10.95	£5.95	□ □ □
			or £19.95		□ □ □
			10% off total		
DBS Software for use with Dragon 40 and Disk Drive					
"Dynamic Spreadsheets"	Disc	£10.95	£5.95	□ □ □	
"Spreadsheets"	Disc	£10.95	£5.95	□ □ □	
"M.S.T. Basic processor"	Disc	£10.95	£5.95	□ □ □	
"Basic 40"	Disc	£10.95	£5.95	□ □ □	
"Other Accounting Options"	Disc	£10.95	£5.95	□ □ □	
"C Compiler"	Disc	£10.95	£5.95	□ □ □	
"Pascal"	Disc	£10.95	£5.95	□ □ □	
"Basic Accounting"	Disc	£10.95	£5.95	□ □ □	
"Disk and VDU"	Disc	£10.95	£5.95	□ □ □	
"And Programming's Manual"	Disc	£10.95	£5.95	□ □ □	

Other Utilities

Title	Publisher	Medium	R.P.P.	Price	Box
Class Doctor	Software	Cartr	£10.95	£5.95	□ □ □
Eye Plus	Software	Cartr	£10.95	£5.95	□ □ □
Air Crash	Software	Cartr	£10.95	£5.95	□ □ □
DBS	Software	Cartr	£10.95	£5.95	□ □ □
DBS	Software	Cartr	£10.95	£5.95	□ □ □
Smart Basic Compiler	Smart	Cartr	£10.95	£5.95	□ □ □
Print Pascal	Smart	Cartr	£10.95	£5.95	□ □ □
Compiler	Dragon Data	Cartr	£10.95	£5.95	□ □ □
Dragon	F.C.S.	Cartr	£10.95	£5.95	□ □ □

GAMES

Latest Arrivals

Title	Publisher	Medium	R.P.P.	Price	Box
Apple Steady Go	Innovate	Cartr	£10.95	£5.95	□ □ □
Star Trek	I.T. Solutions	Cartr	£10.95	£5.95	□ □ □
Wolframaster	Dragon Data	Cartr	£10.95	£5.95	□ □ □
(Copy + Cart)					
Dark Star	Software	Software	£7.95	£3.95	□ □ □
Other Games:					
Tom Lewis Cricket	Frontsoft	Cartr	£10.95	£5.95	□ □ □
Family Games 2000 (selected)	Frontsoft	Cartr	£10.95	£5.95	□ □ □
SDI	Frontsoft	Cartr	£10.95	£5.95	□ □ □
Photo Finish	Frontsoft	Cartr	£10.95	£5.95	□ □ □
Kid Trilogy	Software	Cartr	£10.95	£5.95	□ □ □
Block Break	Software	Cartr	£10.95	£5.95	□ □ □
3D Solitaire	Software Projects	Cartr	£10.95	£5.95	□ □ □
Space Miner	Software Projects	Cartr	£10.95	£5.95	□ □ □
Return of the King	Software	Cartr	£10.95	£5.95	□ □ □
Postman Pat	Software	Cartr	£10.95	£5.95	□ □ □

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